60V N -ch MOSFET

# 2SK3711

December 2005

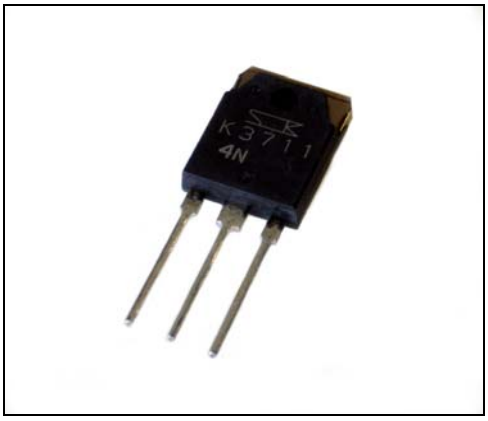
## ■Features

- Low on-resistance
- Built-in gate protection diode
- Avalanche energy capability guaranteed

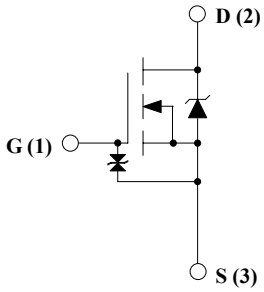
## ■Applications

- Electric power steering
- High current switching

## ■Package—TO3P




## ■Equivalent circuit




## Absolute maximum ratings

(Ta=25°C)

| Characteristic | Symbol | Rating | Unit |
|---|---|---|---|
| Drain to Source Voltage | VDSS | 60 | V |
| Gate to Source Voltage | VGSS | ±20 | V |
| Continuous Drain Current | ID | ±70A | A |
| Pulsed Drain Current | ID (pulse) *1 | ±140A | A |
| Maximum Power Dissipation | PD | 130 (Tc=25°C) | W |
| Single Pulse Avalanche Energy | EAS *2 | 468 | mJ |
| Channel Temperature | Tch | 150 | °C |
| Storage Temperature | Tstg | -55 to 150 | °C |

*1 PW≤100μs, duty cycle≤1%

*2 VDD=20V, L=1mH, ILp=25A, unclamped, RG=50Ω. See Fig.1

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## Electrical characteristics

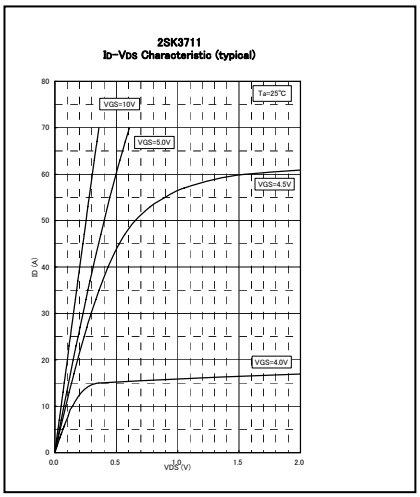
(Ta=25°C)

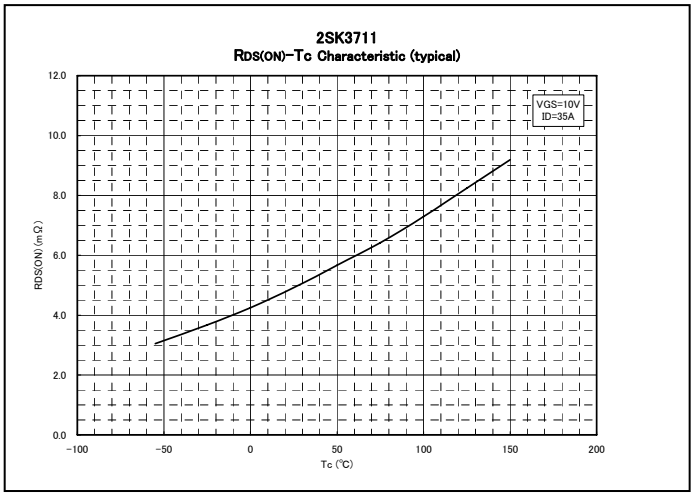
| Characteristic | Symbol | Test Conditions | Limits | | | Unit |
|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | |
| Drain to Source breakdown Voltage | V(BR)DSS | ID=100μA,VGS=0V | 60 | | | V |
| Gate to Source Leakage Current | IGSS | VGS=±15V | | | ±10 | μA |
| Drain to Source Leakage Current | IDSS | VDS=60V, VGS=0V | | | 100 | μA |
| Gate Threshold Voltage | VTH | VDS=10V, ID=1mA | 2.0 | 3.0 | 4.0 | V |
| Forward Transconductance | Re(Yfs) | VDS=10V, ID=35A | 30 | 80 | | S |
| Static Drain to Source On-Resistance | RDS(ON) | ID=35A, VGS=10V | | 5.0 | 6.0 | mΩ |
| Input Capacitance | Ciss | VDS=10V | | 8000 | | pF |
| Output Capacitance | Coss | VGS=0V | | 1250 | | |
| Reverse Transfer Capacitance | Crss | f=1MHz | | 1000 | | |
| Turn-On Delay Time | td(on) | ID=35A, VDD≈20V | | 110 | | ns |
| Rise Time | tr | RL=0.57Ω, | | 100 | | |
| Turn-Off Delay Time | td(off) | VGS=10V | | 440 | | |
| Fall Time | tf | Rg=22Ω<br>Refer to Fig. 2 | | 160 | | |
| Source-Drain Diode Forward Voltage | VSD | ISD=50A,VGS=0V | | 0.9 | 1.5 | V |
| Source-Drain Diode Recovery Time | trr | ISD=25A,<br>di/dt=50A/μs | | 100 | | ns |

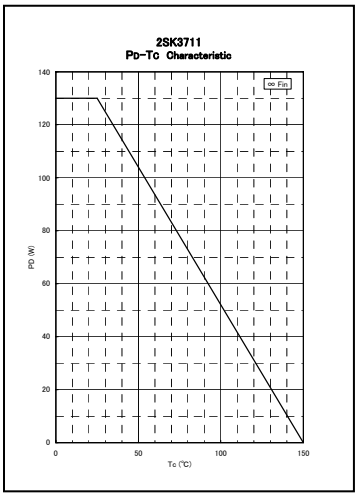
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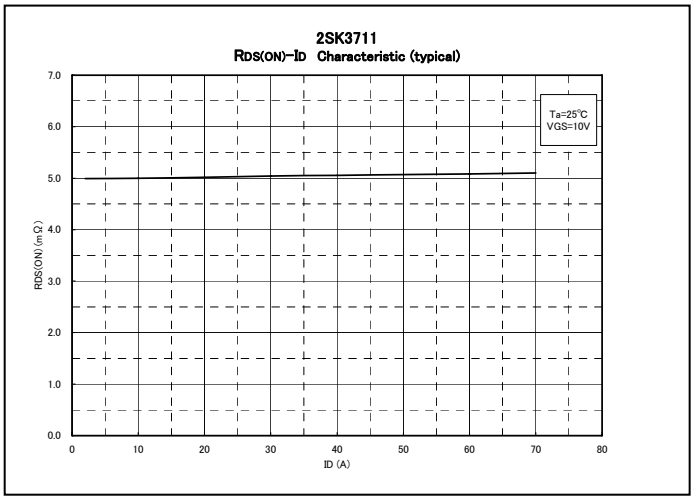
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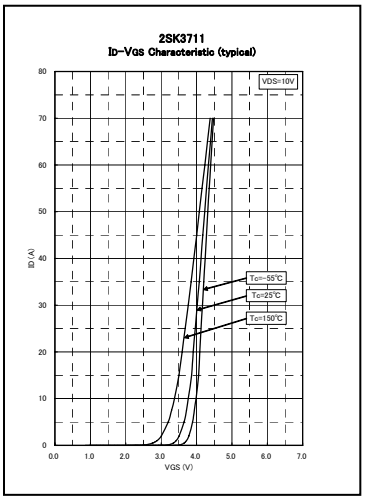
## Characteristic Curves (Tc=25°C)

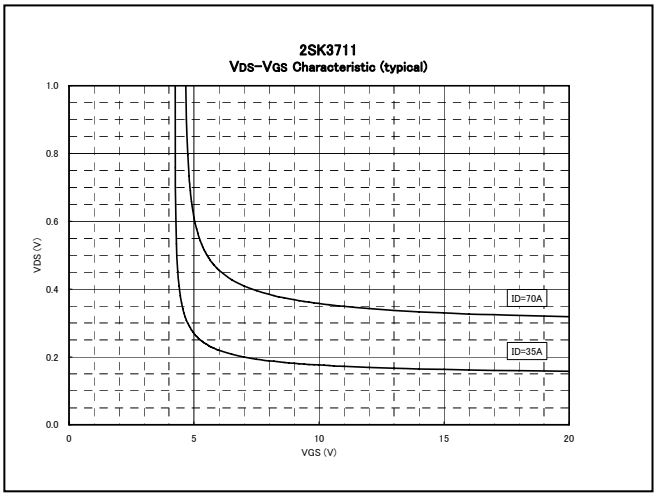


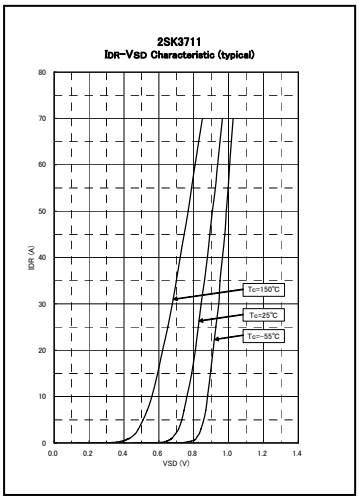



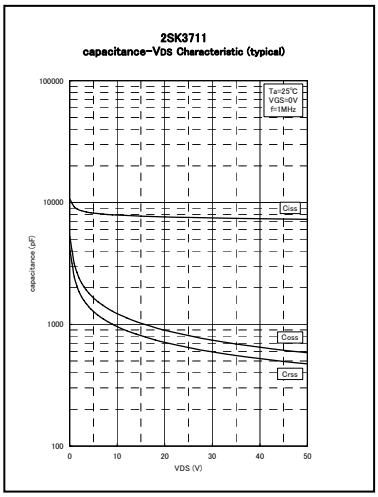



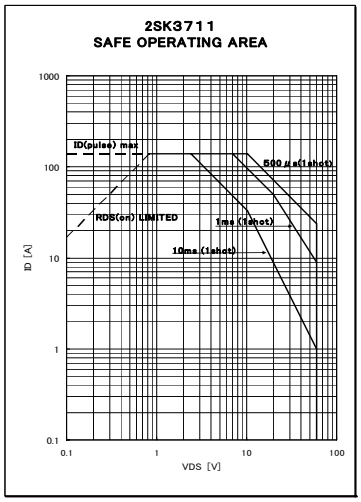
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## Characteristic Curves (Tc=25°C)



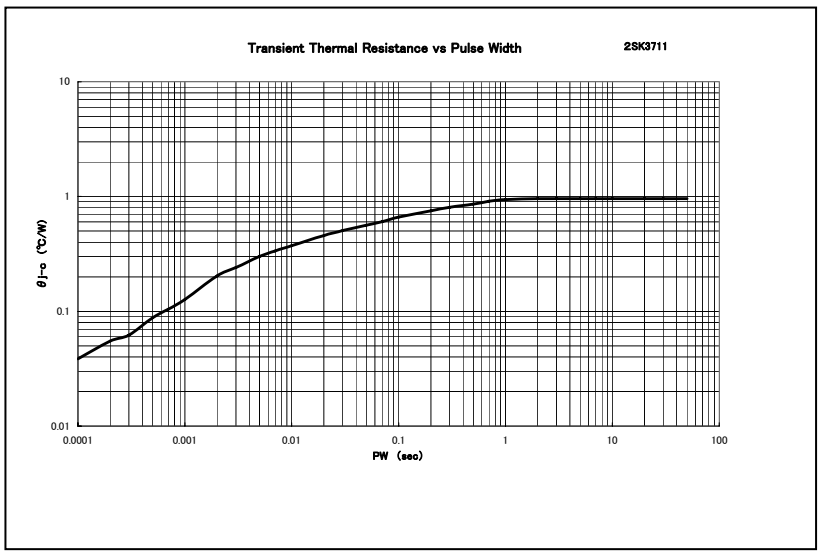
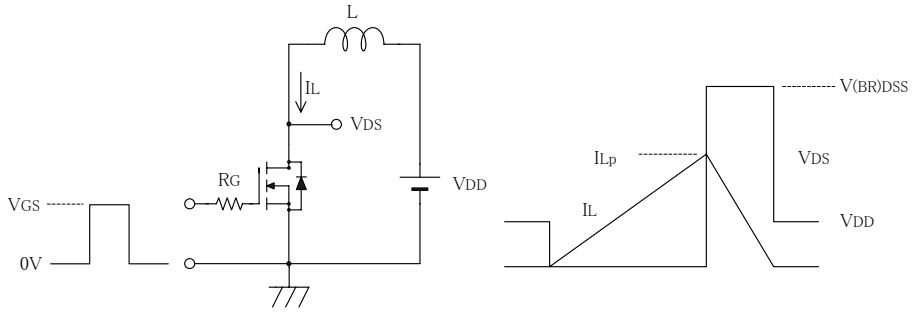



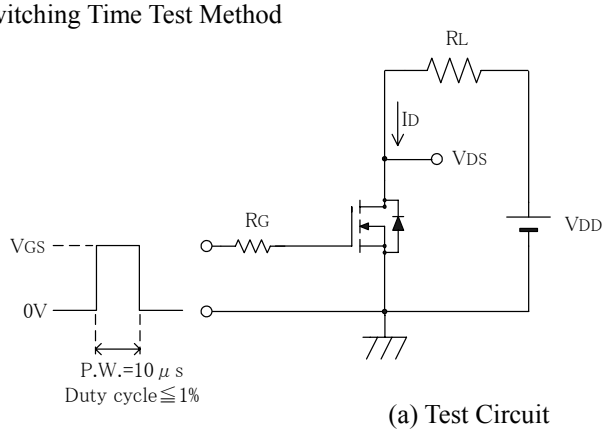
Fig.1 Unclamped Inductive Test Method

$$EAS=\frac{1}{2}\bullet L\bullet ILP^2\bullet\frac{V_{(BR)DSS}}{V_{(BR)DSS}-V_{DD}}$$



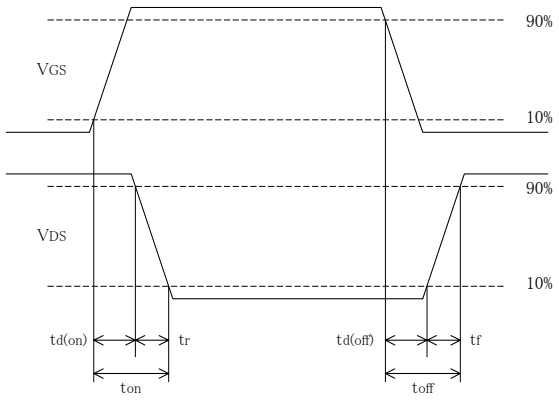

(a) Test Circuit (b) Waveforms

Fig.2 Switching Time Test Method




VDD≈20V
ID=35A
RL=0.57Ω
VGS=10V
RG=22Ω

(a) Test Circuit



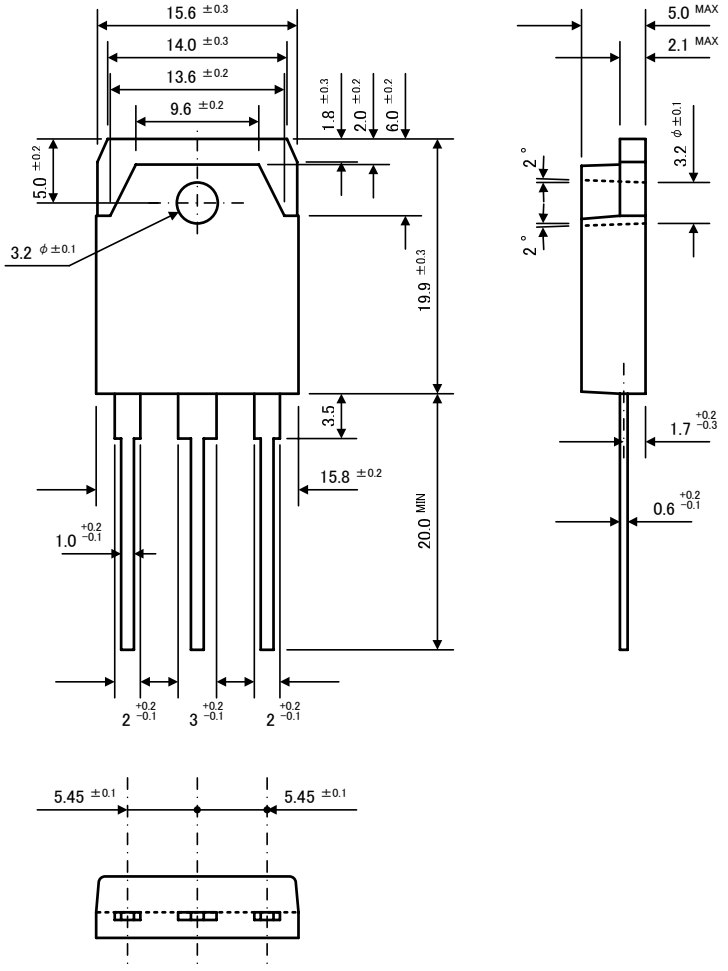

(b) Waveforms

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## External Dimensions

MT100 (TO3P )




Mass: Approx. 6.0g

(1) Gate

(2) Drain (Back Side)

(3) Source

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